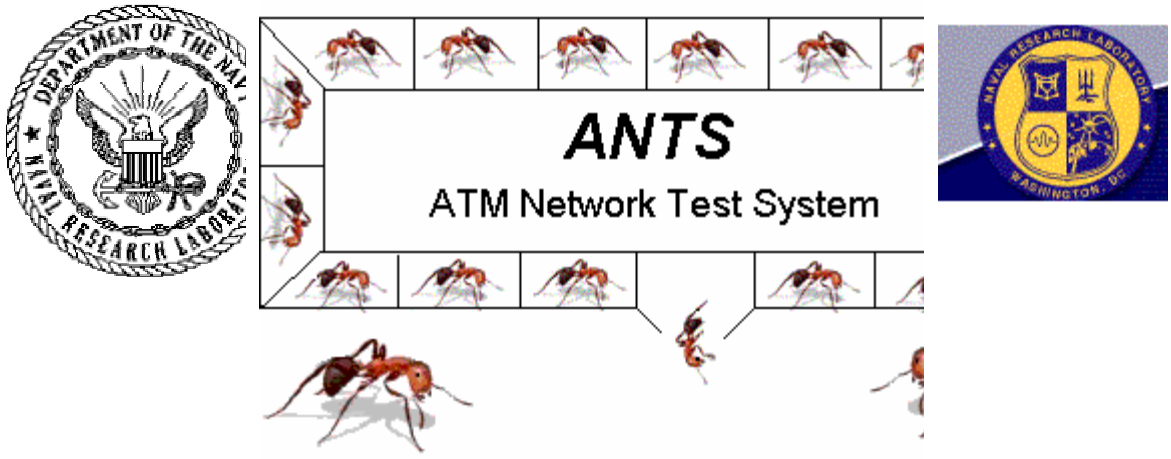


ANTS is a *Linux* based open source software tool developed by the Network and Communication Systems branch at NRL. Designed to be flexible, ANTS is a distributed test environment that evaluates ATM networks for latency, jitter, loss, and QoS. Data streams are sent across switched (SVC) or virtual (PVC) circuits. SVCs can be signaled with QoS. Data cells may be sent periodically or with statistical distribution via the *client* process, while distributed *servers* capture the cells and log them locally. Currently CBR and UBR are available and a VBR driver is expected soon. Script files may be used to drive multiple streams of generated cell patterns over a specified time period. ANTS may be run in either GUI or command-line mode.

Quick Links

ANTS Usage

ANTS may be run in either Command-line mode or GUI mode. Within each mode, there are many options which provide the user with a great deal of flexibility.

ants -h displays the following :

ants usage:

GUI mode: **ants -g**

Command-line mode:

Server:			**default value**
	ants	**-s**	
		-spvc	
Client			
	ants	**[-h** help **]**	none
		[-p vpi.vci (PVC only) **]**	none
		[-a address (nsap or name) **]**	none
		[-f script file **]**	none
		[-n total number of calls **]**	1
		[-td test duration **]**	0 (infinite)
		[-cr call rate (calls/sec) **]**	No delay
		[-dr data rate (cells/sec) **]**	0 (setup only)
		[-dd data distribution **]**	periodic
		[-type (UBR, CBR, VBR) **]**	UBR
		[-vcpcr vc peak cell rate **]**	1
		[**-cp** call pattern **]**	periodic
		[**-cd** call duration (secs) **]**	-1 = permanent 0 = immediate tear-down

Example Usage

command line mode - client:

example 1 - Establish an SVC with pc *JET*. Send 1000 cells per second (cps). Disconnect after 90 seconds:

ants -a JET -dr 1000 -cd 90

example 2 - Establish 100 SVCs at 2 per second (i.e. one half second delay between each call) with a data rate of 1024 cps per svc. Each SVC will connect to pc *JET* and will automatically disconnect after 90 seconds. SVC 1 will connect immediately, SVC 2 at 0.5 sec, SVC 3 at 1.0 sec, etc... . SCV 1 will disconnect at 90 sec, SVC 2 will disconnect at 90.5 sec, SVC 3 will disconnect at 91.0 sec, etc... .

ants -a JET -n 100 -dr 1024 -cd 90

example 3 - Activate 3 PVCs with vp.vc 0.201, 2.56, and 6.30 respectively. Each PVC should send 500 cps, and will de-activate after 10 hours (i.e. 36,000 seconds).

ants -a -p 0.201,2.56,6.30 -dr 500 -cd 36000

example 4 - Establish 12 SVCs (again to pc *JET*) with a 0.25 second delay between each call (i.e. 1st SVC immediately, 2nd SVC in 0.25 seconds, 3rd SVC in 0.5 seconds, 4th SVC in 1.0 seconds, etc...). Specify a *constant bit rate* (CBR) with a *peak cell rate* (PCR) of 2500 cps. Each svc will attempt to send 2500 cps, however rather than each svc sending one cell precisely every 0.0004 seconds (0.0004 * 2500 = 1), the delay between cells will vary according to a poisson distribution with a mean of 0.0004.

ants -a JET -cr 4 -type CBR –vcpcr 2500 -dr 2500 –dd poisson

example 5 - To run the *ANTS* client in command-line mode with script file "test.ant" (scripts are discussed below), simply type:

ants -f test.ant

server mode:

The *ANTS* server is designed to accept and receive SVCs and user specified PVCs. A cell log is created each time the ants server is fired up, and each received cell is noted. The cell log is discussed in detail below.

example 5 - Have the server accept *only* SVCs:

ants -s

example 6 - Have the server accept SVCs and PVC 0.201:

ants -spvc 0.201

example 7 - Have the server accept SVCs and PVCs 0.201,0.202,1.101,3.101:

ants -spvc 0.201,0.202,1.101,3.101

ANTS Script Format

ANTS script lines follow the following syntax:

<time in seconds> <flow #> <keyword> [<options ...>]

The first field is the time (in seconds) that the event is to take place. 0 means immediate, 1 means one second following the commencement of the script, 3.25 means three and one quarter seconds following commencement etc... .

The flow ID is any unique integer that you wish to use to reference the flow. No two flows may have the same flow ID.

The list of possible keywords is as follows. Keep in mind that each script line has one (and only one) keyword.

keyword	meaning
CBR	constant bit rate
UBR	unspecified bit rate
VBR	variable bit rate (not yet implemented)
STOP	suspend cell transfer for the flow associated with *flow ID*
START	start (or resume) cell transfer for the specified flow
CLOSE	close the socket for the VC associated with *flow ID*
DATA	the DATA keyword precedes the *pattern* option. Two patterns, PERIODIC and POISSON are currently supported, however additional patterns can easily be installed. Following the pattern, comes the cell rate specification for the indicated flow. Data specifications may also be appended to lines using the CBR or UBR keywords (see example script).

Following the CBR or UBR keyword, the script line must specify PVC or SVC to signal the type of socket needed for the flow. In the event of a CBR call, a PCR value follows the PVC/SVC flag.

Comment lines begin with the pound (#) sign.

Following is an example of an ANTS script:

```
# comment: ants_test1.ant
#
# At time 0, flow 1 starts sending  25 cps to watto-a through a UBR SVC
0   1 UBR SVC watto-a
0   1 DATA PERIODIC 25
# The above two lines may be combined as:
# 0 1 UBR SVC watto-a DATA PERIODIC 25
#
# At time 3, flow 2 starts sending 750 cps across VP.VC 0.201
#   with PCR set to 750 using a poisson distribution
3   2 CBR PVC 0.201 750 DATA POISSON 750
#
# At time 6.5, flow 1 slows down to 10 cps
6.5  1  DATA PERIODIC 10
#
# At time 10, flow 3 establishes an SVC with pc bossk-a without data
10  3 UBR SVC bossk-a
#
```

```
# At time 15, flow 3 starts sending 100 cbs
15  3  DATA  PERIODIC 100
#
# At time 20, flow 2 data stream is modified to periodic 500 cps
20  2 DATA PERIODIC 500
#
# At time 25, flow 1 stops and the svc is disconnected
25  1 CLOSE
#
# At time 30, flow 3 stops sending data but remains open
30  3 DATA STOP
#
# At time 35, flows 2 and 3 are disconnected
35  3 CLOSE
35  2 CLOSE
```

ANTS Log File Format

After the client successfully establishes a VC with a server, the client immediately sends a *control* cell to the server which contains the client's specified flow ID. The client name and the flow ID together form a unique flow identification for the server cell log.

Following is a simple client script along with the resulting server cell log. The client is *z-4194-a.* The server is *watto-a*.

```
# At time 0.00 (i.e. the start of the test) establish an SVC with watto-a
0.00 1 UBR SVC watto-a
# Once the SVC is established, immediately begin sending 2 cells per second periodically
0.00 1 DATA PERIODIC  2.00
# At time 6.00 (i.e. 6 seconds after the test begins) close the svc
6.00 1 CLOSE
# Having sent 2 cells per second for 6 seconds, a total of 12 cells should have been sent
```

note: The first 2 lines of the above script:

```
  0.00 1 UBR SVC watto-a
  0.00 1 DATA PERIODIC  2.00
```

may be combined into the single line:

```
 0.00 1 UBR SVC watto-a DATA PERIODIC  2.00
```

When the above script has finished, the cell log in **watto-a** directory *ants/reports/* will resemble the following:

```
Initialization Cell - Flow: 1 Client: z-4195-a
Client: z-4195-a   Flow: 1 Cell: 1 Tx: 11:05:36.444924 Rx: 11:05:36.230250
Client: z-4195-a   Flow: 1 Cell: 2 Tx: 11:05:36.893728 Rx: 11:05:36.677410
Client: z-4195-a   Flow: 1 Cell: 3 Tx: 11:05:37.393727 Rx: 11:05:37.177336
Client: z-4195-a   Flow: 1 Cell: 4 Tx: 11:05:37.893725 Rx: 11:05:37.677266
Client: z-4195-a   Flow: 1 Cell: 5 Tx: 11:05:38.393725 Rx: 11:05:38.177211
Client: z-4195-a   Flow: 1 Cell: 6 Tx: 11:05:38.893725 Rx: 11:05:38.677140
```

```
Client: z-4195-a   Flow: 1 Cell: 7 Tx: 11:05:39.393726 Rx: 11:05:39.177074
Client: z-4195-a   Flow: 1 Cell: 8 Tx: 11:05:39.893726 Rx: 11:05:39.677013
Client: z-4195-a   Flow: 1 Cell: 9 Tx: 11:05:40.393726 Rx: 11:05:40.176946
Client: z-4195-a   Flow: 1 Cell: 10 Tx: 11:05:40.893725 Rx: 11:05:40.676876
Client: z-4195-a   Flow: 1 Cell: 11 Tx: 11:05:41.393726 Rx: 11:05:41.176817
Client: z-4195-a   Flow: 1 Cell: 12 Tx: 11:05:41.893726 Rx: 11:05:41.676752
```

The transmit time (Tx) and receive time (Rx) are in the form:

hour:min:sec:usec

Next, we have an example with 2 flows, one SVC and one PVC:

```
#Establish SVC flow 1 to watto-a at time 0.00 and send 1 cps
0.00 1 UBR SVC watto-a
0.00 1 DATA PERIODIC     1.00
#Enable the preexisting PVC VP.VC 0.201 at time 0.00 and send 1 cps
0.00 2 UBR PVC 0.201
0.00 2 DATA PERIODIC     1.00
#After 5 seconds, close flow 1
5.00 1 CLOSE
#After an additional 5 seconds (time 10.00) we disable flow 2.
10.00 2 CLOSE
```

Following is an example log file for the above script:

```
Initialization Cell - Flow: 2 Client: z-4195-a
Initialization Cell - Flow: 1 Client: z-4195-a
Client: z-4195-a   Flow: 2 Cell: 1 Tx: 9:36:52.406015 Rx: 09:36:52.148245
Client: z-4195-a   Flow: 1 Cell: 1 Tx: 9:36:52.406002 Rx: 09:36:52.148314
Client: z-4195-a   Flow: 1 Cell: 2 Tx: 9:36:52.245912 Rx: 09:36:52.973659
Client: z-4195-a   Flow: 2 Cell: 2 Tx: 9:36:52.245890 Rx: 09:36:52.973766
Client: z-4195-a   Flow: 1 Cell: 3 Tx: 9:36:53.245892 Rx: 09:36:53.974028
Client: z-4195-a   Flow: 2 Cell: 3 Tx: 9:36:53.245916 Rx: 09:36:53.974135
Client: z-4195-a   Flow: 1 Cell: 4 Tx: 9:36:54.245911 Rx: 09:36:54.974402
Client: z-4195-a   Flow: 2 Cell: 4 Tx: 9:36:54.245890 Rx: 09:36:54.974509
Client: z-4195-a   Flow: 1 Cell: 5 Tx: 9:36:55.245891 Rx: 09:36:55.974775
Client: z-4195-a   Flow: 2 Cell: 5 Tx: 9:36:55.245911 Rx: 09:36:55.974894
Client: z-4195-a   Flow: 2 Cell: 6 Tx: 9:36:57.319216 Rx: 09:36:57.073240
Client: z-4195-a   Flow: 2 Cell: 7 Tx: 9:36:57.245890 Rx: 09:36:57.975503
Client: z-4195-a   Flow: 2 Cell: 8 Tx: 9:36:58.245892 Rx: 09:36:58.975877
Client: z-4195-a   Flow: 2 Cell: 9 Tx: 9:36:59.245892 Rx: 09:36:59.976248
Client: z-4195-a   Flow: 2 Cell: 10 Tx: 9:37:00.245891 Rx: 09:37:00.976613
```

ANTS GUI

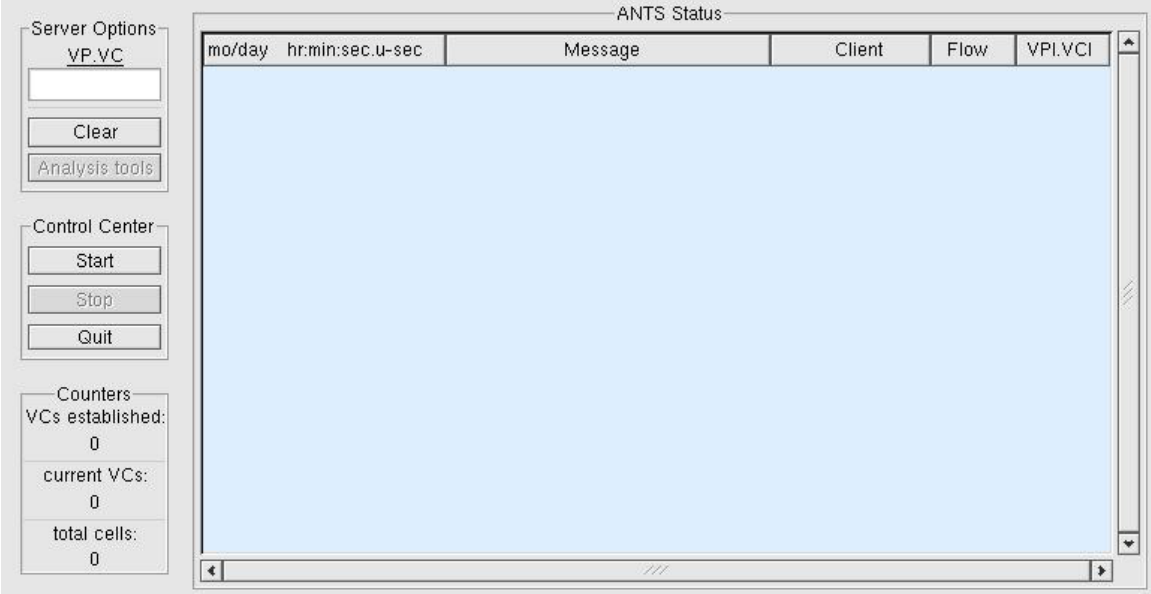
To start ANTS in gui mode simply type:

ants -g

The following screen will appear:

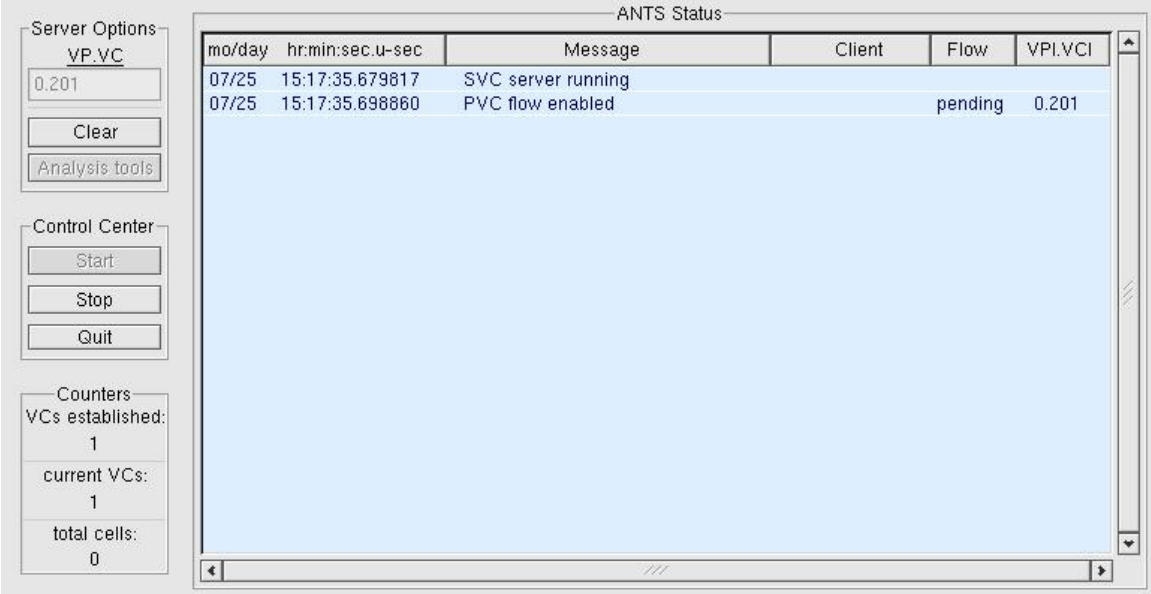
ANTS GUI server

After selecting the Server button shown in the above screen, the following window will appear:



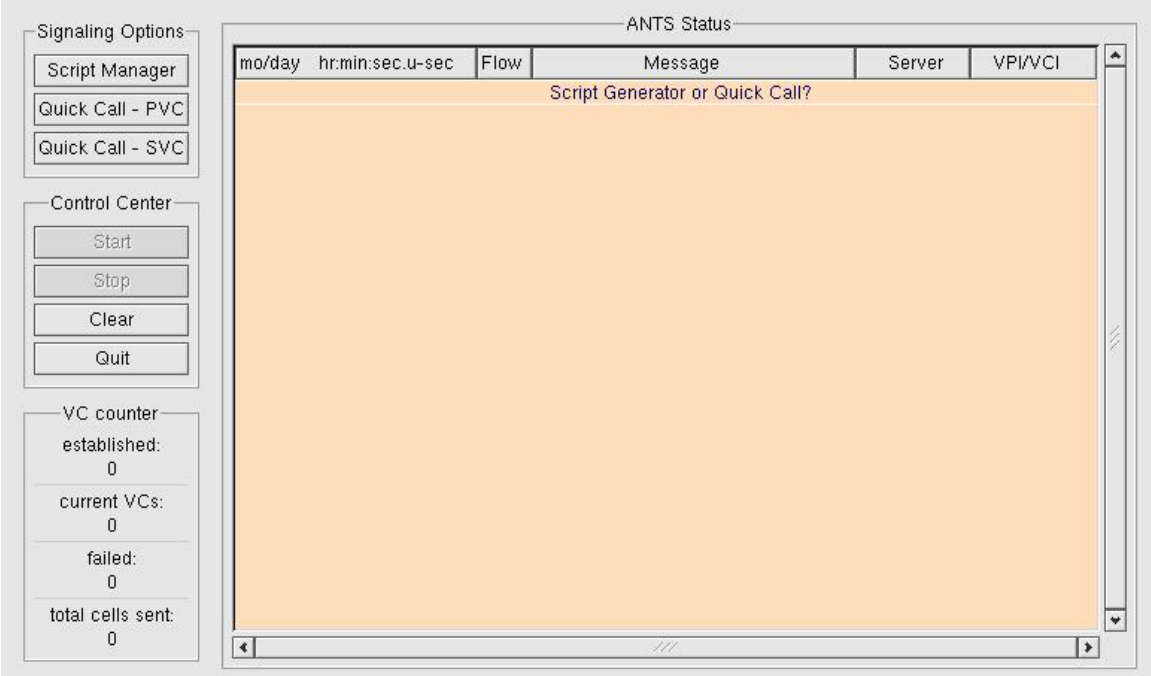
By simply clicking the start button, Mgen will listen for SVCs from any client.

If you wish to listen for one or more specific PVCs, enter the VC.VP in the window (as shown in the figure below). Multiple VC.VP pairs may by entered separated by commas (exp: 0.201,0.202,3,200 ...). ANTS will listen for SVCs as well as the PVCs entered.



ANTS GUI client

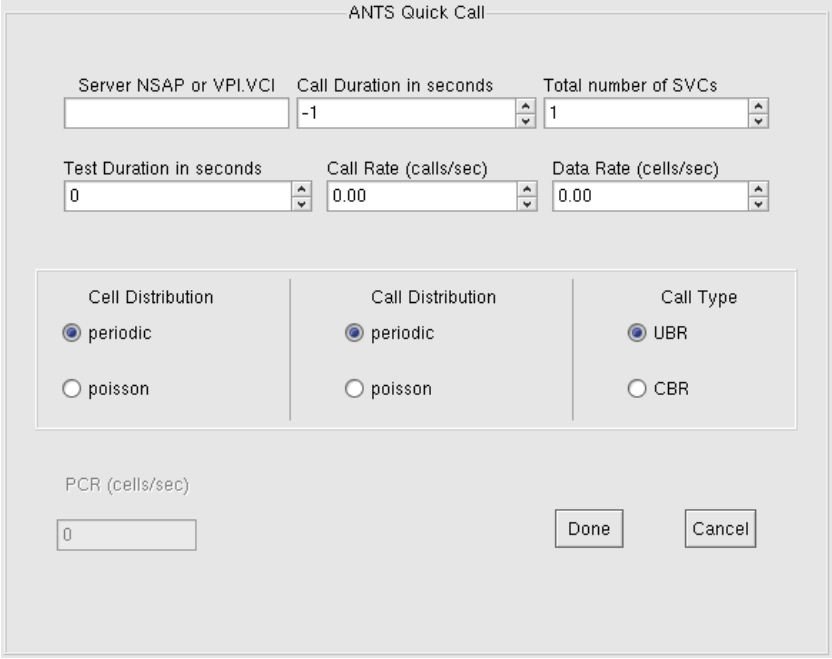
Clicking the client button on the opening screen brings up the following window:



The gui provides two methods for running tests: scripts and quick-calls. As can be seen above, quick-calls are divided into two groups: PVC and SVC. The gui is the same for

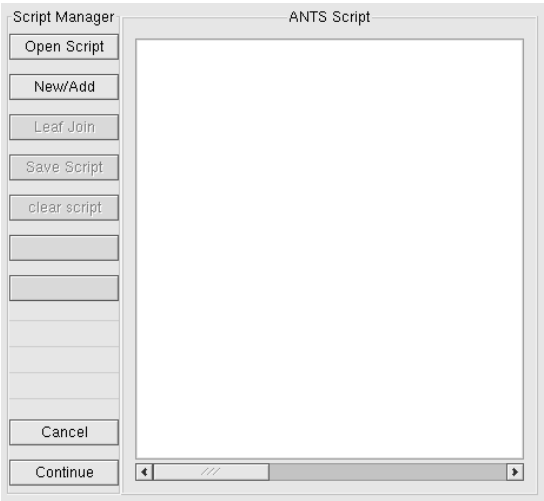
both with the exception that SVC calls prompt for the server name/nsap while the PVC calls prompt for the shared vp.vc.

Quick Call

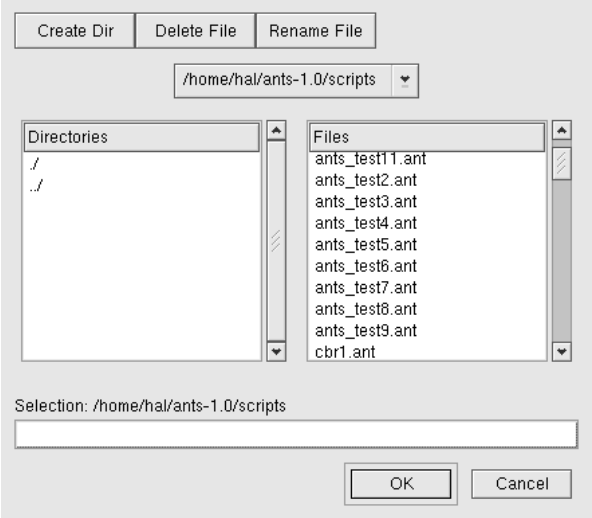


Script Manager

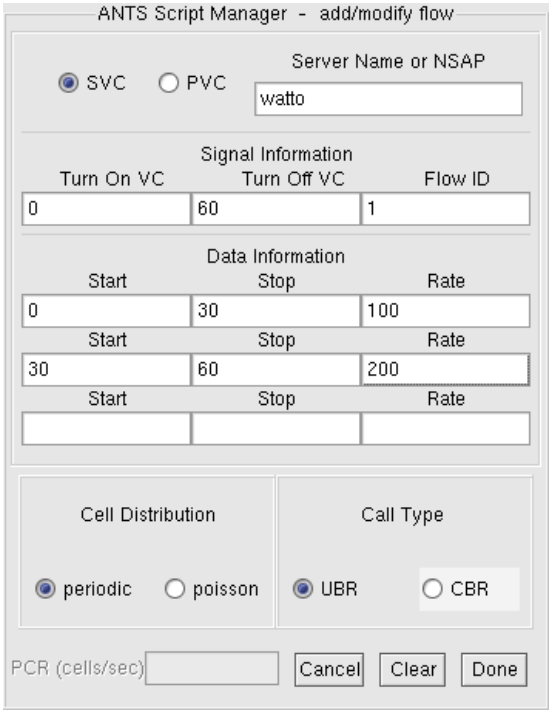
ANTS Script Manager allows you to select an existing script or create a new one.



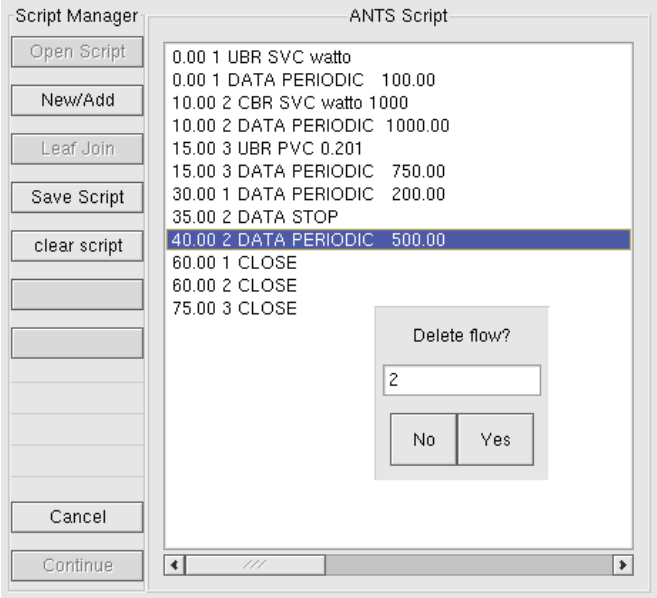
To select an existing script, click the *Open Script* button shown above. The following screen will appear, listing all of the files contained in the ants/scripts/ directory. Simply select the script and click *OK*.



Selecting the *New/Add* option from the Script Manager window brings up the Script Generator window (the values will initially be blank).



ANTS Script Generator allows you to build a script one call at a time. There is no limit (other than memory) as to the number of calls a script may contain. Each time the (above) screen is filled in, followed by clicking the *Done* button, a new flow is added to the script. If a mistake is made, clicking on any line will provide the option of deleting the flow referenced within that line. The flow may then be reentered if you so choose.



At any time, the script may be saved by clicking the *Save Script* within the *Script Manager* window. You will then be prompted for the script name. We recommend ending the name with **.ant** however that is optional. Unless specified differently, the script will be stored in the *ants/scripts/* directory.